

Results on Blue Whiting Spanish Discard Sampling Programme

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Abstract

*Quarterly discards per ICES Divisions estimates for the Spanish bottom otter trawl fleet fishing in the Northeast Atlantic ICES Subareas VI, VII, VIII and IX are presented for blue whiting (*Micromesistius poutassou*). Information was obtained by observers on board under DCF discard sampling program carried out by the Spanish research institute IEO. Raising based on effort (number of trips) was used to estimate total quarterly discards in weight and number for the most important fleets of Bottom Otter Trawlers. Discards age distributions are also presented.*

Discards are highly variable throughout the series, both in weight and in number ranging from 680 to 6 800 tonnes per quarter and from 1 to 68 million fish. 100% catches are discarded in Sub-areas VI-VII. The highest discards weights are in Divisions VIIIc and VIIj. There is a seasonal pattern of discard being generally higher in the second quarter, although there are years with high values in other quarters.

Age distributions of blue whiting discards in Divisions VIIIc and IXaN show that most of the individuals are juveniles (ages 0 to 3), however older than are also discarded.

Keywords: Blue whiting, Discards, Northeast Atlantic waters, Bottom Otter Trawl.

1. Introduction

The “Spanish Discards Sampling Programme” was started in 1988. It does not cover every year because its implementation has depended on funding from several national and European research projects, which have not had an annual continuity. For this reason information is presented only since 2003:

Year	Project
1988-1989	National project
1994	EC Project: Pem/93/005
1997	EC Project: 95/ 094
1999-2000	EC Project: 98/095
2001	EC Project: 99/063
2003-2014	Data Collection Regulation Programme (Spain)

Spanish data on blue whiting discards have been provided to ICES WGWIDE in the past, but it was aggregated by year till 2010 and by Northern and Southern regions for all available series (2003 to 2012).

The main objective of this working document is to present the Spanish blue whiting discards estimates since 2003 by quarter and Division. Information on sampling discard strategy and discard reasons is also presented.

2. Material and methods

The sampling strategy and the estimation methodology used in the “Spanish Discards Sampling Programme” are similar since 1994, and are in accordance with the “*Workshop on Discard Sampling Methodology and Raising Procedures*” guidelines (ICES, 2003). The observers-on-board programme is based on a stratified random or cooperative sampling design. Métier is the stratum and trips (the sampling units) are randomly selected for sampling within of some métiers. Until 2009 the DCR asked for annual estimates and, hence, sampling was organised so as to obtain annual results.

The differences between the discards estimates presented here and those previously presented to the ICES WGWIDE are that now estimates are presented by quarter (instead of annually) and by ICES Divisions. The raising is done based on quarterly effort per métier. Total fleet discard per division are estimations from the total métier discard raising to the effort in each Division. This is because there are Division with no discard sampling per quarter.

Only the trawl fleet is considered for this species from the Spanish Discards Sampling Programme. This is because previous observations carried out on long line vessels showed low discarding levels for this species and area (Pérez et al., 1996). No information is available for gillnet in Sub-areas VI-VII, but discards of blue whiting in this gear are considered low. Information from the IXaS subdivision is available, but discarded weight is only presented because the samples are very irregular and sampled period shorter.

For discards sampling purposes, two métiers are considered within the Spanish trawl fleet operating in the ICES Sub-areas VI and VII, taking into account fishing area, gear and target. One métier - OTB_DEF_100-119_0_0- is considered to target mainly hake (*Merluccius merluccius*) and anglerfish (*Lophius piscatorius* and *L. budegassa*) and the other one métier OTB_DEF_70-99_0_0 megrim (*Lepidorhombus whiffiagonis* and *L. boscii*) and anglerfish. It was not possible sampled métier OTB_DEF_100-119_0_0 in 2013 so; discard in the métier OTB_DEF_70-99_0_0 was raised to the both métiers effort.

Three métiers are considered within the Spanish trawl fleet operating in the ICES Sub-areas VIII and IX, Northern Spanish coastal bottom otter trawl fleet: One métier OTB_DEF_>=55_0_0 targeting a variety of demersal species in ICES Divisions VIIIc and IXa-North, other coastal bottom otter trawl fleet but with higher vertical open gear -OTB_MPD_>=55_0_0- targeting horse mackerel (*Trachurus trachurus*) and/or Atlantic mackerel (*Scomber scumbrus*) and a Pair-trawler fleet PTB_MPD_>=55_0_0 targeting blue whiting and/or hake and/or Atlantic mackerel. Results here are showed for the entire trawl fleet, with metiers combined.

For each trip sampled, several hauls are, in turn, sampled as follows. A random sample of all discarded species is selected. Blue whiting in the discards sample is measured for length and the weight is calculated using a length/weight relationship (Dorel, 1986; Cull et al., 1989; Pereda and Pérez, 1995). The resulting blue whiting weight in the discards sample is raised to haul level according to the total discarded weight of the haul and the proportion of blue whiting in the sample. Haul-raised data are further raised to trip level taking into account the total number of hauls in the trip. Trip-raised weight and length values are subsequently raised to quarterly métier level using the number of trips per métier. Total discard per division are estimated raising the métiers values to total division effort (logbooks values since 2012). Effort per divisions, in years previous to 2012, where information disaggregated per division were not available, was estimated with the proportion of number of trip on division logbook effort, to obtain effort estimates for the fleet.

3. Results

Between 1988 and 2001, the sampling has had irregular coverage, with significantly higher levels of sampling in 1988 and 1994. However due sampling during 1988 to 2000 was not systematic information are not used for assessment. The sampling level varies depending on the year (Table 1). The information

can be considered representative of the discard behaviour of the whole Spanish trawl fishery exploiting the blue whiting stock.

Discard estimates by quarter are shown in weight and number in Table 2 and Figure 1-2, and per year in Figure 3. Sub-areas VI_VII show low discard levels in 2012 and the lowest of the series in 2013 (Figure 3). The discard rate does not explain this decrease because 100% of catches are always discarded. Observer on board indices (kg caught per haul in OTB_DEF_70-99_0_0) show a small decrease in these both years (Figure 4), however, the strong effort reduction in that period is probably the mayor reason for the discard observed decrease (Figure 5).

Divisions VIIIc and IXa show a gradually declined in discards weight since 2006 increasing slightly in the last 3 years (Figure 3). The discard rates vary widely in these zones (Figure 6) but only PTB_MPD_>=55_0_0 métier show some diminution in discard rates. Observer on board indices of kg caught per haul show different patter according to métier (Figure 7). Only the OTB_DEF_>=55_0_0 métier shows a gradually decrees in abundance indices since 2003, due probably the specialization of this métiers in high commercial value species as hake, megrims or anglerfishes (Santos et al, 2012). Only the métier (PTB_MPD_>=55_0_0) shows higher catch indices in the last years which may explain the slight increase in discards in recent years, because is the métier with the highest weights of discards in the area. No effort reduction in that period is observed (Figure 8).

Observer on board indices (kg caught per haul) for all métiers show a relatively stable values since 2004 after a pick in 1997 (Figure 9).

Figures 10 and 11 show the quarterly age composition of the discards. Discards are concentrated in Divisions VIIj and VIIIc. Age distributions of blue whiting discards in Divisions VIIIc and IXaN show that most of the individuals are juveniles (ages 0 to 3), however older than are also discarded

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Table 1. Quarterly discard sampling level. Haul observation on board

Year	Quarter	Vla	Vlb	Vllb	Vllc	Vllg	Vllh	Vllj	Vllk	Vlllc	IXaN	IXaS
2003	1											
	2				18		5	64	20	36	29	
	3						6	87		37	24	
	4				3			147	19	30	11	
2004	1				30			48	12	41	8	
	2				4			123	3	39	9	
	3		19		20			13	7	30	10	
	4				26			90		34	6	
2005	1				33			38		46	31	5
	2			11	5	5	30	52	2	57	10	20
	3						21	67		63	17	1
	4				4	7		52	9	33	11	
2006	1				2	27		69	10	40	19	
	2			4	20		45	61	15	40	20	9
	3			22	46			41		52	23	20
	4							14		14	7	
2007	1				1	5		65	11	43	4	
	2				27		14	41	17	54	12	12
	3				30			34	2	34	33	16
	4			22	16			75	8	47	29	
2008	1							32		71	14	
	2			9	24	5	29	46	5	56	32	3
	3		32	11	24		11	60	7	49	46	15
	4			1	27			89	14	38	23	
2009	1							60	29	46	16	2
	2			20	48		17	43	26	69	32	6
	3				14	2	5	105	4	81	28	9
	4				59			16	10	57	36	12
2010	1				11			29	24	27	14	2
	2					6	1	91	13	118	15	10
	3				57			10		71	19	10
	4			15	2	1		99	23	59	14	8
2011	1				18			46	10	74	13	5
	2						9	60		91	6	11
	3							92		103	12	12
	4		11		10		20	9	8	88	7	5
2012	1					5	17	88	14	83	15	7
	2					18	4	81		100	18	16
	3							34		75	23	8
	4				7		28	38	6	45	17	9
2013	1					1	41	62		69	5	6
	2						8	93		114	22	12
	3			10	9	4	2	8	1	56	9	8
	4				14		22	40	1	41	8	7

Table 2. Blue whiting quarterly discard estimates in weight (tonnes) and number (in thousands) for the Spanish trawl fishery, operating in Sub-areas VI-VII-VIII and Division IXa per Divisions

		VIa	VIb	VIIb	VIIc	VIIg	VIIh	VIIj	VIIk	VIIIc	IXaN	IXaS
2003	1									0	0	
	2	0	33	34	400	27	217	755	469	1766	1129	
	3	2	30	7	55	5	56	286	53	806	673	
	4	0	1	2	16	4	18	108	38	636	542	
2004	1	0	2	3	55	17	99	563	126	704	639	
	2	4	40	35	134	67	148	498	129	623	626	
	3	0	36	17	148	40	188	727	169	386	402	
	4	0	11	14	64	18	51	390	155	385	342	
2005	1	0	29	86	272	71	260	1575	230	338	91	
	2	0	51	38	315	59	231	1014	386	414	67	
	3	0	16	10	146	18	79	537	223	966	172	
	4	1	3	3	14	2	9	68	35	352	64	
2006	1	0	0	1	24	2	14	200	138	834	830	
	2	0	6	17	66	9	34	179	89	271	267	
	3	4	46	51	155	30	156	659	120	331	327	
	4	4	66	85	244	66	189	878	91	626	751	
2007	1	0	4	24	95	5	38	494	311	83	82	
	2	1	5	66	236	4	33	414	335	635	706	
	3	3	20	28	150	10	64	477	109	618	559	
	4	1	5	14	43	8	11	134	63	238	203	
2008	1	0	0	8	73	1	15	226	180	269	227	
	2	0	2	23	78	2	16	167	123	109	97	
	3	0	13	21	257	17	28	347	262	364	319	
	4	5	14	119	379	66	88	953	491	341	284	
2009	1	18	1	38	332	37	2	1074	861	139	109	0
	2	0	20	81	228	27	129	726	182	263	260	299
	3	0	2	35	147	17	58	405	131	180	153	154
	4	0	1	37	185	9	32	482	227	166	126	18
2010	1	0	0	0	0	0	1	173	166	116	108	0
	2	362	10	33	32	0	66	969	506	246	247	10
	3	30	14	6	12	0	33	457	122	280	263	85
	4	5	5	1	5	0	48	574	135	88	59	59
2011	1	6	2	13	68	0	7	352	57	173	111	75
	2	106	8	17	101	0	21	375	13	385	220	0
	3	154	0	57	385	7	97	1965	183	318	362	7
	4	10	5	27	86	1	13	861	471	193	222	44
2012	1	161	0	22	31	0	30	711	404	277	101	0
	2	420	0	26	97	0	43	291	131	368	170	2
	3	1	0	0	27	0	22	221	4	507	211	0
	4	0	7	20	7	0	22	185	10	153	82	0
2013	1	6	0	2	6	5	22	149	19	187	73	49
	2	55	0	11	21	0	26	298	21	743	318	72
	3	31	4	0	37	0	15	255	20	895	371	5
	4	0	1	5	2	0	6	41	1	387	166	22

Figure 1. Blue whiting quarterly discard estimates in weight (tonnes) for the Spanish trawl fishery in ICES Sub-area

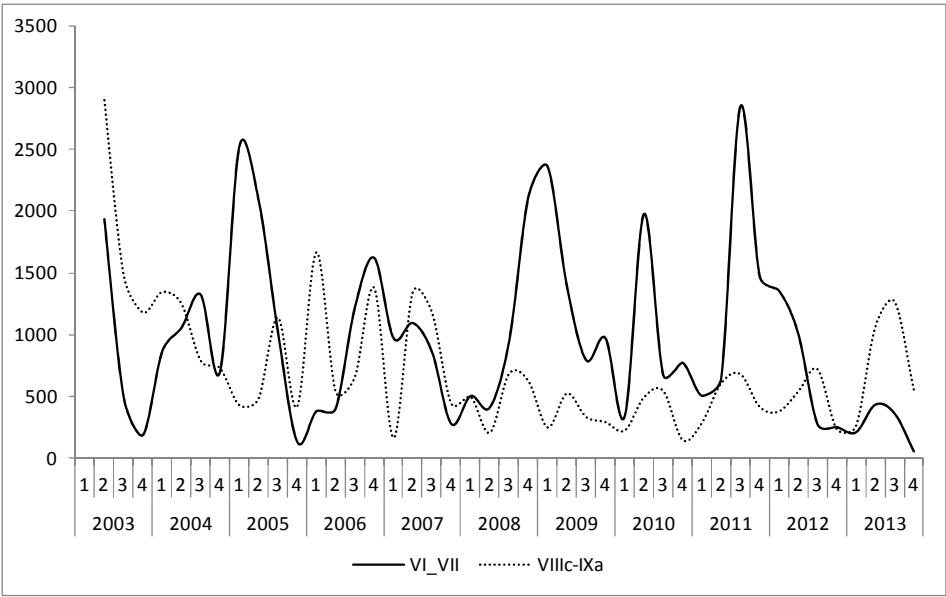


Figure 2. Blue whiting quarterly discard estimates in number (thousands) for the Spanish trawl fishery in ICES Sub-areas

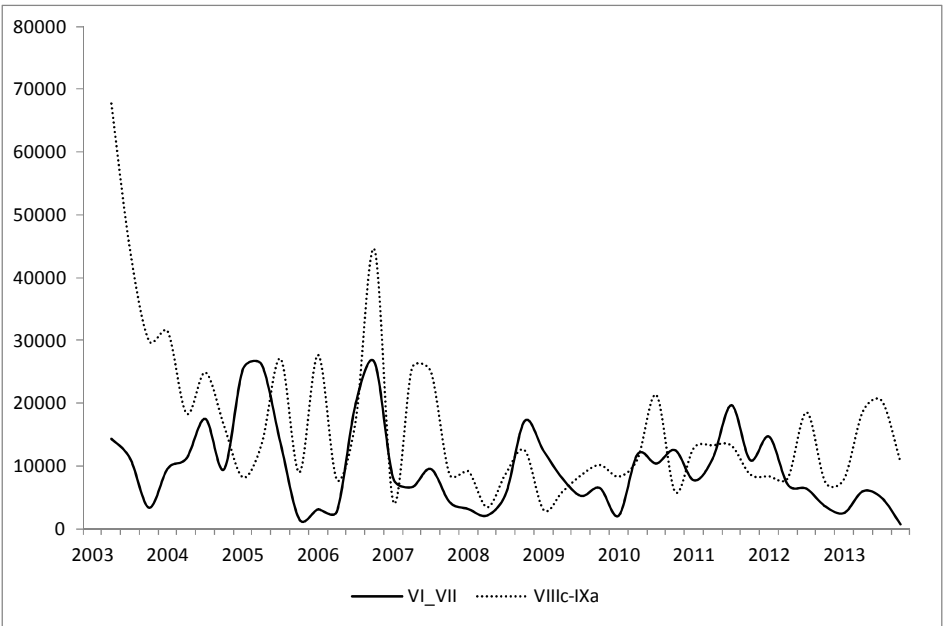


Figure 3. Blue whiting yearly discard estimates in weight (tonnes) for the Spanish trawl fishery in ICES Sub-areas

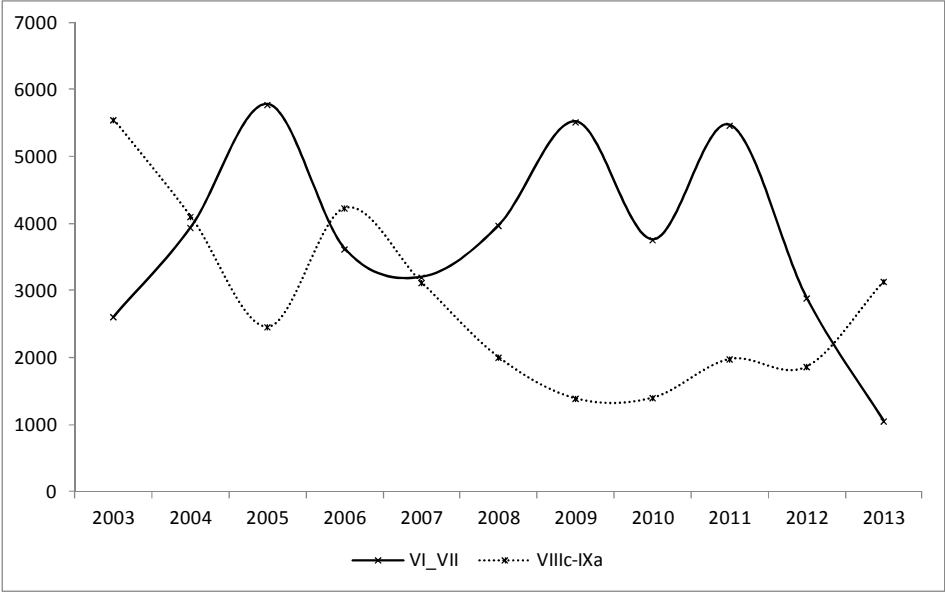


Figure 4. Observer on board indices (kg caught per haul) from métiers operated in Sub-areas VI_VII

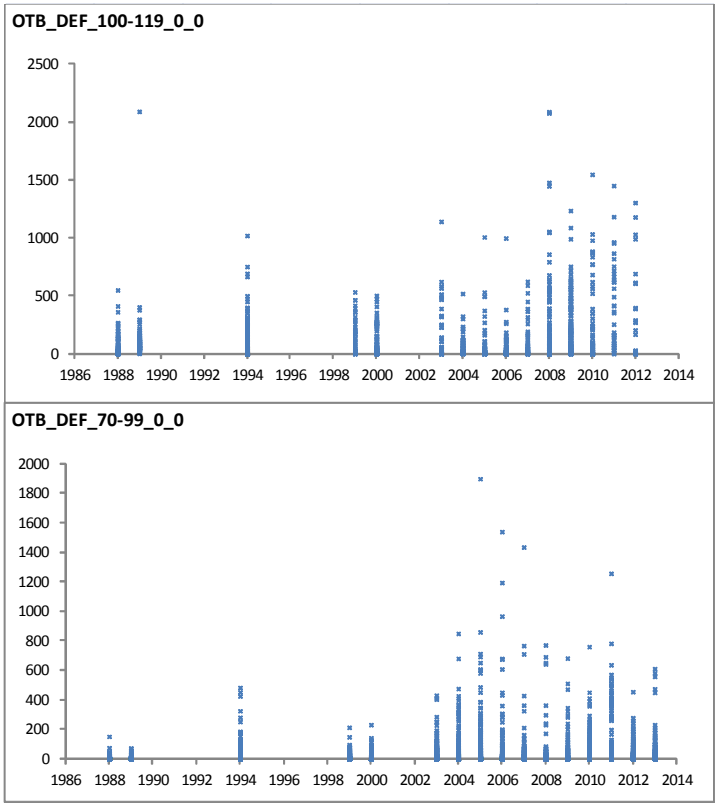


Figure 5. Effort in number of trips in Sub-areas VI_VII

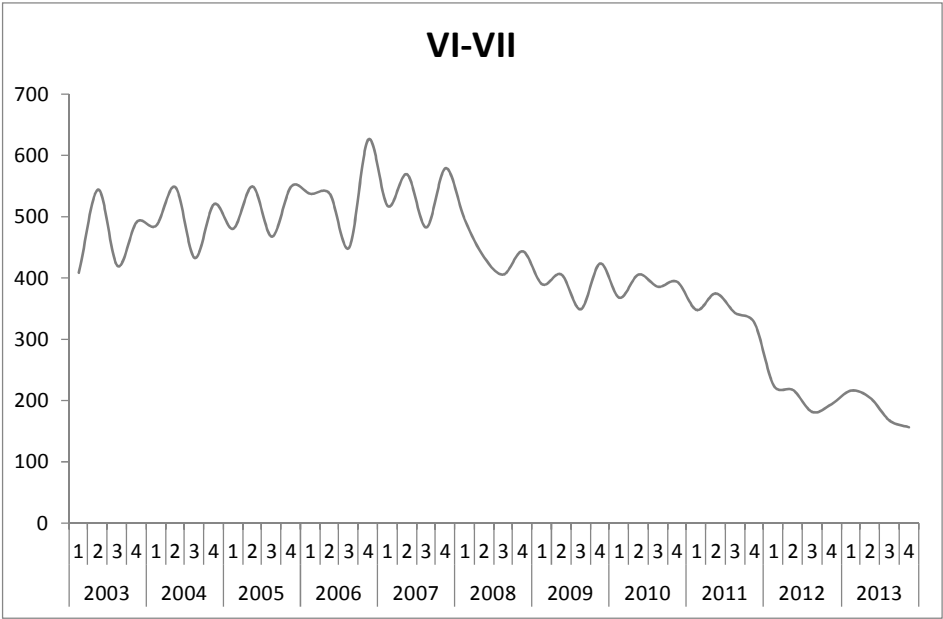


Figure 6. Discard rate (discard weight/catch weight) by métier in Divisions VIIIc and IXa. 1994-2013

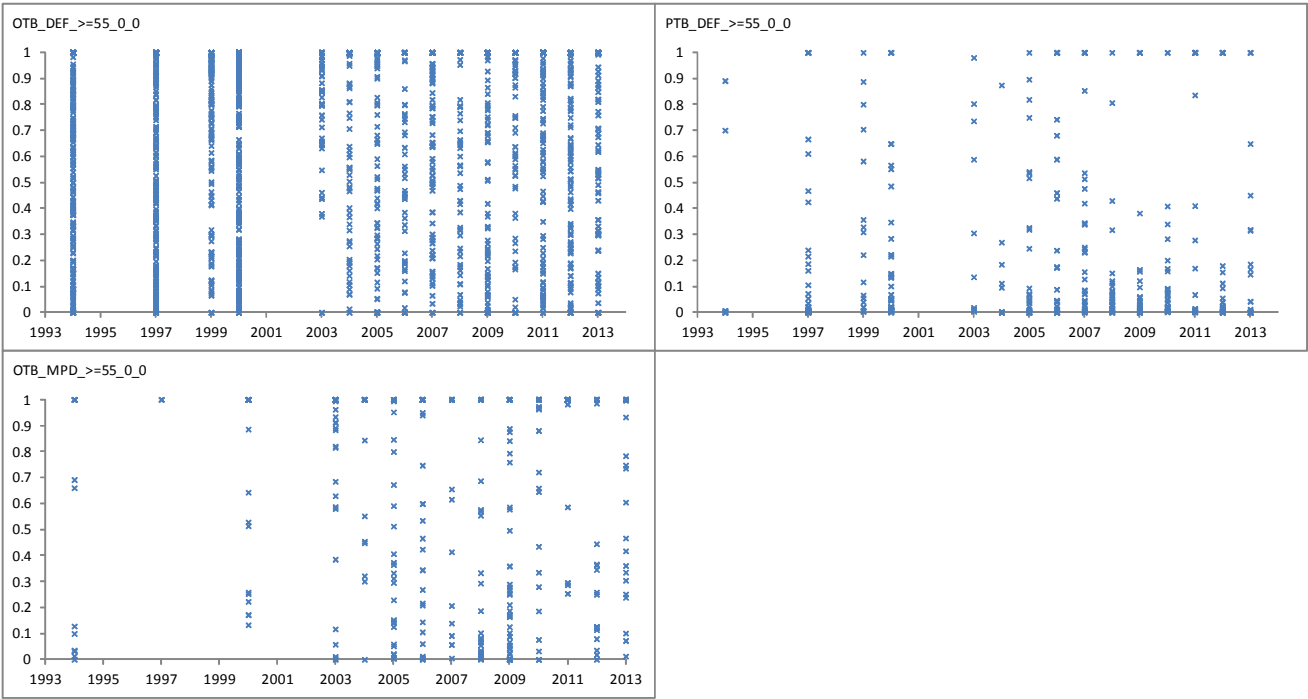


Figure 7. Total catch per haul (kg) in observed trips of OTB_DEF_>=55_0_0, OTB_MPD_>=55_0_0 and PTB_MPD_>=55_0_0

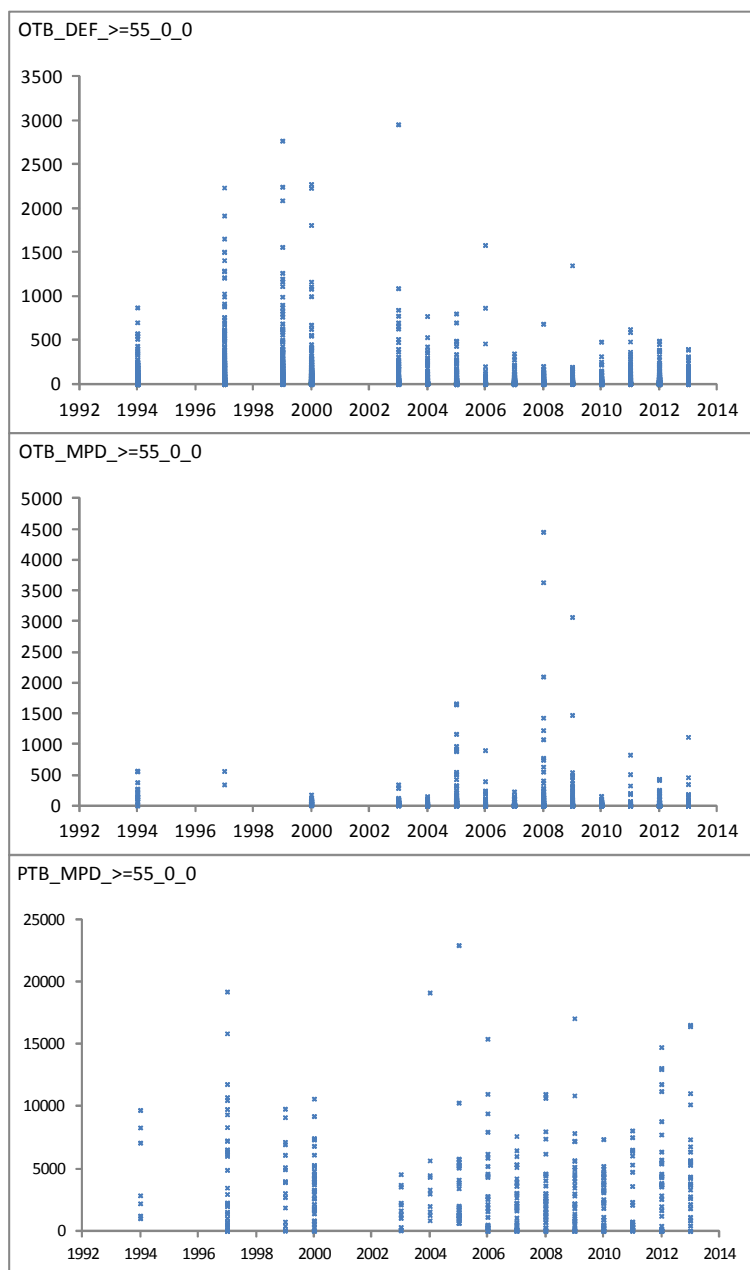


Figure 8. Effort in number of trips in Divisions VIIIc, IXaN

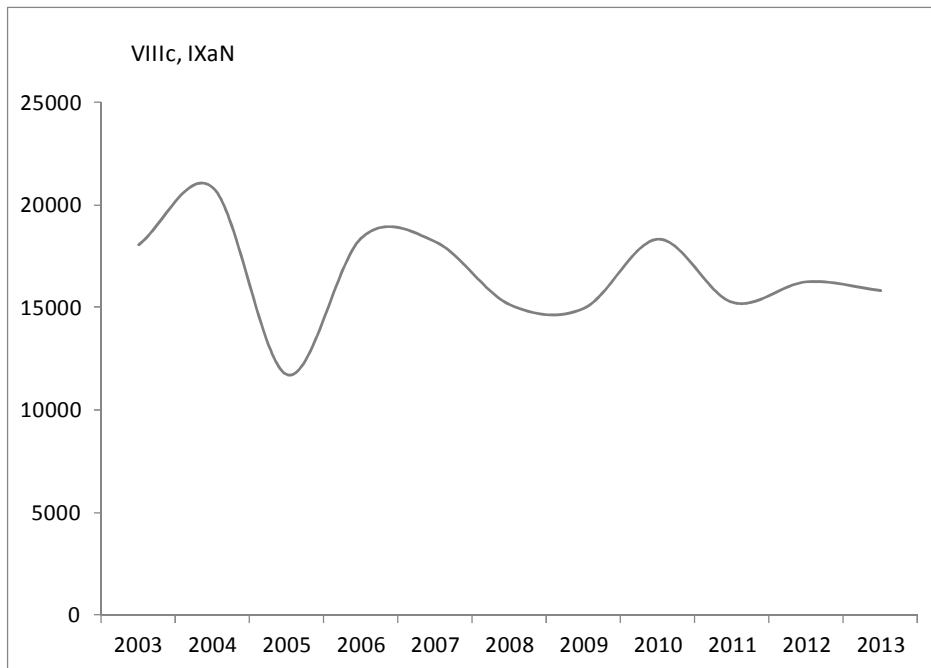


Figure 9. Observer on board indices; kg caught/ haul (points, on the left axis) and mean kg caught/haul (line, on the right axis) from all métiers.

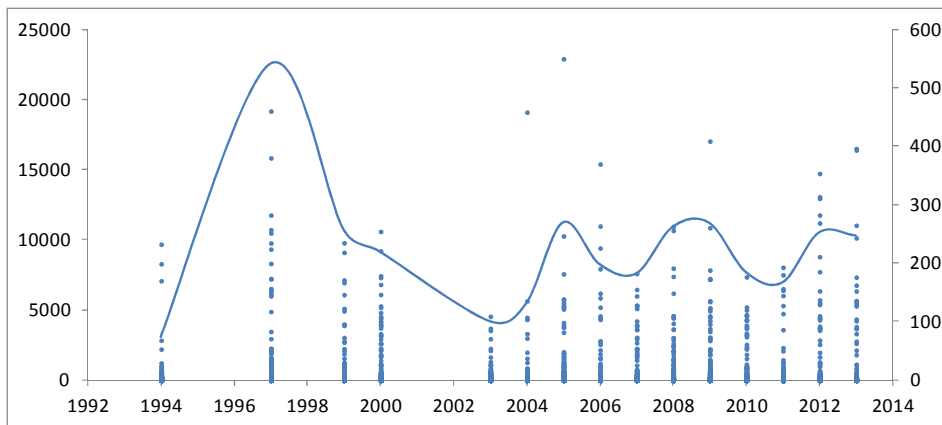


Figure 10. Quarterly age composition of Spanish trawl discards of blue whiting in ICES Sub-areas VI and VII.

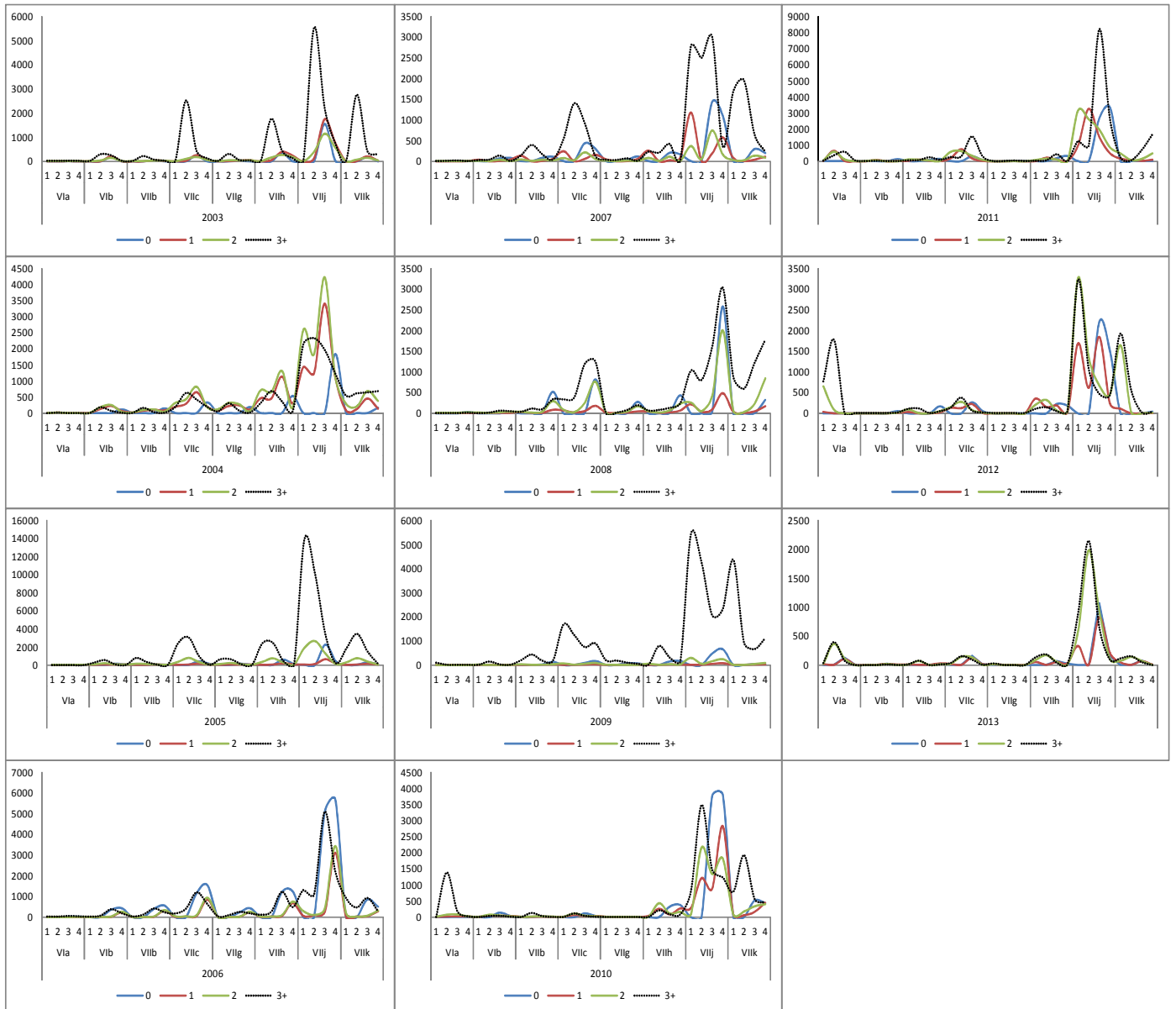


Figure 11. Quarterly age composition of Spanish trawl discards of blue whiting in ICES Divisions VIIIc-IXaN.

